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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/989,179      | 11/21/2001  | Michiharu Aratani    | 2975.0008           | 9420             |

5514 7590 12/14/2004

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| EXAMINER |
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LAM, HUNG H

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| ART UNIT | PAPER NUMBER |
|----------|--------------|

2615

DATE MAILED: 12/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/989,179

Applicant(s)

ARATANI ET AL.

Examiner

Hung H. Lam

Art Unit

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claim limitation recited claim 3 "a drive means which relatively moves the plurality of optical blocks and the imaging element to change the space between the optical blocks and imaging" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1,2,4-9,11 and 15/11 are rejected under 35 U.S.C. 102(b) as being anticipated by Satoshi (H10-107975).

Regarding claim 1, Satoshi discloses a compound eye imaging system (Drawing 1), comprising a plurality of optical blocks and an imaging element for picking-up object images formed by the optical blocks in imaging ranges provided for each optical block (Drawing 1, 4, Lenses 15, Sensors 17; Detail Description, section 0029), wherein optical axes of the optical blocks intersect each other at the object side (see Drawing 1, 4 and 6).

Regarding claim 2, Satoshi discloses a compound eye imaging system wherein all the optical axes of the plurality of optical blocks roughly intersect each other at one point (see Drawing 1, 4 and 6).

Regarding claim 4, Satoshi disclose a compound eye imaging system wherein a plurality of imaging blocks, which comprise the imaging ranges that are different from each other, are formed in the imaging element (Detail Description; section 0030-0031).

Regarding claim 5, Satoshi discloses a compound eye imaging system wherein the imaging element is constructed so that the plurality of imaging blocks are formed on a single substrate (Drawings 4, sensor 20; Drawing 9, CCD area sensor 2; Detail Description, section 0011, 0029).

Regarding claim 6, Satoshi discloses a compound eye imaging system wherein the imaging element is constructed by forming the plurality of imaging blocks on a single semiconductor substrate (See Figures 1 and 2 and note that a plurality of photo-detection sections 17 each have a plurality of semiconductor device area sensors 20 mounted thereon, and are themselves mounted on a single curved supporting material).

Regarding claim 7, Satoshi discloses a compound eye imaging system wherein the plurality of optical blocks are unified (Drawings 1, 4, 7, 8; optical lenses show in one array).

Regarding claim 8, Satoshi discloses a compound eye imaging system wherein at least one of the optical action surfaces comprising the plurality of optical blocks has an aspherical shape (see Drawing 4 and 7).

Regarding claim 9, Satoshi discloses a compound eye imaging system wherein an optical action surface comprising at least one optical block of the plurality of optical blocks has a rotational asymmetric aspherical shape ( Drawing 1, rotational asymmetric are formed at the central sensor).

Regarding claim 11, Satoshi discloses an imaging device, comprising the compound eye imaging system (See Drawings 1,4,6,7,9; Detail Description; section 0001; section 0003).

Regarding claim 15/11, Satoshi discloses an electronic equipment comprising the imaging device (See Drawings 1,4,6,7,9; Detail Description; section 0001; section 0003).

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Satoshi in view of Nakajima et al. (US-5,048,106).

Regarding claim 3, Satoshi fails to further disclose a compound eye imaging system comprising a drive means which relatively moves the plurality of optical blocks and the imaging element to change the space between the optical blocks and imaging element. However, the limitations are well known in the art as taught by Nakajima.

In the same field of endeavor, Nakajima teaches an image reader wherein upon varying the magnification, the focusing lens is moved along the optical axis thereof and the image sensor is also moved relative to the focusing lens (Figs. 5, 7; CCD Array 9, Focusing Lens 8; col. 1, lines 17-24; col. 3, lines 26-34; col. 6, lines 54 - col. 7, line 24). In light of the teaching from Nakajima, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the compound eye imaging system in Satoshi to move the focusing lens along optical axis and move the image sensor relative to the focusing lens in order to obtain a highly accurate focal length and a high resolution image (col. 1, lines 17-20; col. 7, lines 25-31).

7. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Satoshi in view of Meyers (US-5,751,492).

Regarding claim 10, Satoshi disclose a compound eye imaging system, but Satoshi does not explicitly teach that an optical action surfaces comprising the plurality of optical blocks is a diffraction action surface. However, the limitations are well known in the art as taught by Meyers.

In the same field of endeavor, Meyers teaches a lenslet array (10) comprising diffractive surfaces 18/20 (Fig. 2, 18, 20; col. 4, lines 15-20). Meyers further teach that individual lenslets 10 of Figs. 1 and 2 are segmented and formed into a lenslet array 60 (col. 4, lines 23-25). In light of the teaching from Meyers, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the aspherical lenses in Satoshi to the diffractive surface taught by Meyers in order to correct the chromatic aberrations and to provide the majority of focusing power (col. 4, lines 16-18).

8. Claims 12-13, 15/12 and 15/13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satoshi in view of Sugiyama et al. (US-6,046,795).

Regarding claim 12, Satoshi fails to teach an imaging device wherein a distance to an object is measured based on outputs from a pair of imaging ranges for picking-up an image of the object through a pair of optical blocks in the imaging element. However, the limitations are well known in the art as taught by Sugiyama.



In the same field of endeavor, Sugiyama teaches a distance-measuring instrument comprising a pair of image pickup means (Fig. 9, CCD 53a, 53b) and arithmetic means using two images of the measured object which is photographed by image pickup means to calculate the distance to the object base on the principle of triangulation (col. 1, lines 10-40). In light of the teaching from Sugiyama, it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure distance to an object using a pair of the existing image sensor array taught in Satoshi in order to provide an accurate distance measuring device in all temperature ranges (col. 3, lines 60-64).

Regarding claim 13, Satoshi fails to teach that the distances to an object is measured based on outputs from multiple pairs of imaging ranges. However, the limitations are well known in the art as taught by Sugiyama.

In the same field of endeavor, Sugiyama teaches a distance-measuring instrument comprising a pair of image pickup means (Fig. 9, CCD 53a, 53b) and arithmetic means using two images of the measured object which is photographed by image pickup means to calculate the distance to the object base on the principle of triangulation (col. 1, lines 10-40). In light of the teaching from Sugiyama, it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure distance to an object using a pair of the existing image sensor array taught in Satoshi in order to provide an accurate distance measuring device in all temperature ranges (col. 3, lines 60-64).

Satoshi, as modified by Sugiyama, does not teach the average value of distances to an object is measured based on outputs from multiple pairs of imaging ranges

However, the examiner takes official notice that it is well known in the art for averaging out multiple measuring distance value to obtain more precise measurement. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to average more distance measuring values from multiple pair of sensors in order to pursuit for a more accurate distance measuring capability.

Regarding claims 15/12 and 15/13, Satoshi and Sugiyama teach an electronic equipment comprising the imaging device (Satoshi, Drawings 1,4,6,7,9; Detail Description; section 0001; section 0003; Sugiyama, Fig. 9, CCD 53a, 53b, col. 5, lines 3-22).

9. Claims 14 and 15/14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satoshi in view of Muramoto et al. (US-6,507,359).

Regarding claim 14, Satoshi fails to teach an imaging device wherein an object image is synthesized by picking-up images of an object that is more distant than the intersection of the optical axes of the optical blocks by the imaging element. However, the limitations are well known in the art as taught by Muramoto.

In the same field of endeavor, Muramoto teaches an imaging device having a viewfinder 24 indicates an image synthesized of left and right camera (Figs. 12, viewfinder 24) in accordance to object that is closer to or farther from the intersection between optical axes (Fig. 14; col.15, lines 30-48). Muramoto further teaches that the larger the shift amount is the farther the object from the intersection between the optical axes (col. 15, lines 44-48). In light of the teaching from Muramoto, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the imaging device in Satoshi by synthesizing images of an object that is farther from the intersection of optical axes in order to correctly display the stereoscopic image reflecting photographic conditions and photographic purpose (col. 2, lines 20 -37).

Regarding claim 15/14, Satoshi and Muramoto teach an electronic equipment comprising the imaging device (Satoshi, Drawings 1,4,6,7,9; Detail Description; section 0001; section 0003; Muramoto, Figs. 1, 2; col. 6, lines 55-67).

### ***Conclusion***


10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung H. Lam whose telephone number is 703-305-8143. The examiner can normally be reached on Monday - Friday 8AM - 5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's primary's, NGOC YEN VU can be reached on 703-305-4946. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HL

12/01/04



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